

**Claims**

1. A method for melody representation comprising:
  - (a) converting a melody to a pitch-time series;
  - 5 (b) approximating the pitch-time series to a sequence of line segments in a time domain; and
  - (c) mapping the sequence of line segments in time domain into a sequence of points in a value-run domain.
- 10 2. A method as claimed in claim 1, wherein pitch values are measured as relative pitch, in semitones.
3. A method as claimed in claim 1, wherein in step (a) a non-pitch part is replaced by an immediately previous pitch value.
- 15 4. A method as claimed in claim 1, wherein the melody is input as an analog audio signal.
5. A method as claimed in claim 1, wherein the result of step (c) is used to produce a melody skeleton, the melody skeleton comprising extreme points in the sequence of points.
- 20 6. A method as claimed in claim 1, wherein the result of step (c) is invariant to a tempo of the melody.
- 25 7. A method for creating a database of a plurality of melodies, the method comprising, for each of the plurality of melodies:
  - (a) converting the melody to a pitch-time series;
  - (b) approximately the pitch-time series to a sequence of line segments in a time domain;
  - 30 (c) mapping the sequence of line segments in time domain into a sequence of points in a value-run domain; and
  - (d) storing the sequence of points in the value run domain in the database.
- 35 8. A method as claimed in claim 7, wherein pitch values are measured as relative pitch, in semitones.

9. A method as claimed in claim 7, wherein in step (a) a non-pitch part is replaced by an immediately previous pitch value.
10. A method as claimed in claim 7, wherein the melody is input as an analog audio signal.
11. A method as claimed in claim 7, wherein the result of step (c) is used to produce a melody skeleton, the melody skeleton comprising extreme points in the sequence of points.
12. A method as claimed in claim 7, wherein the result of step (c) is invariant to a tempo of the melody.
13. A method for raising a query to compare an input melody with a plurality of melodies each stored in a database as a stored sequence of points in a value-run domain, the method comprising:
- (a) converting the input melody to a pitch-time series;
  - (b) approximating the pitch-time series to a sequence of line segments in a time domain;
  - (c) mapping the sequence of line segments in the time domain into a sequence of points in a value-run domain; and
  - (d) comparing the sequence of points in the value-run domain for the input melody with each of the stored sequence of points for each of the plurality of melodies to determine a stored melody of the plurality of melodies that matches the input melody.
14. A method as claimed in claim 13, wherein the sequence of points in the value-run domain for the input melody are used to create an input melody skeleton.
15. A method as claimed in claim 14, wherein the input melody skeleton comprises extreme points in the sequence of points.
16. A method as claimed in claim 13, wherein the input melody is input as an analog audio signal.

17. A method as claimed in claim 13, wherein pitch values are measured as relative pitch, in semitones.
18. A method as claimed in claim 13, wherein in step (a) a non-pitch part is replaced by an immediately previous pitch value.
19. A method as claimed in claim 18, wherein the melody is input as an analog audio signal.
20. A method as claimed in claim 19, wherein the result of step (c) is used to produce a melody skeleton, the melody skeleton comprising extreme points in the sequence of points.
21. A method as claimed in claim 13, wherein the result of step (c) is invariant to a tempo of the melody.
22. A method as claimed in claim 20, wherein matching is by sequentially comparing the melody skeleton with the stored melody skeleton until a match is found.
23. A method as claimed in claim 22, wherein non-extreme points in the sequence of points are not considered in the matching process.
24. Apparatus for enabling the raising of an input melody query of a plurality of stored data point sequences melodies in a database, the apparatus comprising;
- (a) a microphone for creating an input analog audio signal of the input melody;
  - (b) a pitch detecting a tracking module for determining pitch values in the input analog audio signal and generating a pitch value time series;
  - (c) a line segment approximation module for approximating the pitch value time series to a line segment series;
  - (d) a mapping module for mapping line segment series to a data point sequence; and
  - (e) a melody search engine to perform a melody similarity matching procedure between the input melody data point sequence and

each of the plurality of stored data point sequences in the database.

25. Computer usable medium comprising a computer program code that is  
5 configured to cause at least one processor to execute on or more functions for raising a query to compare an input melody with a plurality of melodies each stored in a database as a stored sequence of points in a value-run domain by:
- 10 (a) converting the input melody to a pitch-time series;
  - (b) approximating the pitch-time series to a sequence of line segments in a time domain;
  - (c) mapping the sequence of line segments in the time domain into a sequence of points in a value-run domain; and
  - 15 (d) comparing the sequence of points in the value-run domain for the input melody with each of the stored sequence of points in the value run domain of the plurality of melodies to determine a stored melody of the plurality of melodies that matches the input melody.
26. A method for raising a query to compare an input melody with a plurality of  
20 melodies each stored in a database and stored as a melody skeleton, the method comprising:
- (a) converting the input melody to an input melody skeleton;
  - (b) comparing the input melody skeleton with the melody skeleton of each of the plurality of melodies to determine a stored melody of  
25 the plurality of melodies that matches the input melody.
27. A method as claimed in claim 26, wherein the conversion of the input melody to the input melody skeleton is by:
- 30 (a) converting the input melody to a pitch-time series;
  - (b) approximating the pitch-time series to a sequence of line segments in a time domain;
  - (c) mapping the sequence of line segments in the time domain into a sequence of points in a value-run domain; and
  - 35 (d) using extreme points in the sequence of points to form the input melody skeleton.

28. A method as claimed in claim 26, wherein each of the melody skeletons of the plurality of stored melodies is formed by:
- (a) converting the stored melody to a pitch-time series;
  - (b) approximating the pitch-time series to a sequence of line segments in a time domain;
  - (c) mapping the sequence of line segments in the time domain into a sequence of points in a value-run domain; and
  - (d) using extreme points in the sequence of points to form the melody skeleton.
29. A method as claimed in claim 27, wherein pitch values are measured as relative pitch, in semitones; and in step (a) a non-pitch part is replaced by an immediately previous pitch value.
30. A method as claimed in claim 28, wherein in step (a) a non-pitch part is replaced by an immediately previous pitch value; and pitch values are measured as relative pitch, in semitones
31. A method as claimed in claim 27, wherein non-extreme points in the sequence of points are not considered in the matching process.
32. A method as claimed in claim 28, wherein non-extreme points in the sequence of points are not considered in the matching process.

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